A.3 SUN-EARTH CONNECTION

A.3.1 OVERVIEW

The Sun-Earth Connection (SEC) science program of the NASA Office of Space Science (OSS) supports investigations of the Sun and planetary space environments, including the origin, evolution, and interactions of space plasmas and electromagnetic fields in the heliosphere and in connection with the galaxy. Understanding the origin and nature of solar activity and its effect on the space environment of the Earth is a particular focus. The traditional discipline interests have been:

Solar and Heliospheric Physics, which treats the Sun as a typical dwarf star, as the dominant, time-varying source of energy, plasma, and energetic particles in the solar system (especially concerning its influence on the Earth) and the origin and behavior of the solar wind, energetic particles, and magnetic fields in the heliosphere and their interaction with the interstellar medium; and

Geospace Science, which treats the physics of magnetospheres, including their formation and fundamental interactions with plasmas, fields, and particles (the Earth's magnetosphere is emphasized, but studies of the magnetospheres of planets, comets, and other primordial bodies are also supported); and the physics of the mesosphere, thermosphere, ionosphere, and aurorae of the Earth, including the coupling of these phenomena to the lower atmosphere and magnetosphere.

The strategic vision for the Sun-Earth Connection is embodied in the Sun-Earth Connection Roadmap (available on line at http://sec.gsfc.nasa.gov/sec_roadmap.htm The Sun-Earth Connection research program supports several types of endeavors, including Supporting Research and Technology (SR&T) and Low Cost Access to Space (LCAS) programs in the various disciplines, the Sun-Earth Connection Theory Program, as well as a Guest Investigator program. Generic program descriptions follow immediately below, while specific information can be found in the SEC program elements. It is the overall guiding objective of each of these programs to contribute as effectively and directly as possible to the achievement of OSS strategic goals, and priority for selection is given to those proposals that most clearly demonstrate the potential for such contributions.

(1) Supporting Research and Technology (SR&T) programs support individual research tasks that employ a variety of research techniques, e.g., theory, numerical simulation, and modeling; analysis and interpretation of space data; development of new instrument concepts; and laboratory measurements of relevant atomic and plasma parameters, all to the extent they have a clear application to Sun-Earth Connection program goals. The solar and heliospheric SR&T programs are administered as part of the Solar and Heliospheric Physics program element described in Appendix A.3.2, while the magnetosphere, ionosphere, thermosphere, and mesosphere disciplines are included in the Geospace program element described in Appendix A.3.3.

(2) Low Cost Access to Space (LCAS) programs have as their objectives science investigation that may be completed through suborbital rocket, balloon, or Shuttle flight of experiment instrumentation, as well as proof-testing new concepts in experimental techniques that may ultimately find application in free-flying Sun-Earth Connection space missions. The LCAS program for Solar and Heliospheric Physics is treated in the Solar and Heliospheric Physics program element in Appendix A.3.2, and the Geospace LCAS program is treated in the Geospace program element in Appendix A.3.3.

(3) The Sun-Earth Connection Theory Program (SECTP) element, Appendix A.3.4, supports efforts to attack problems concerning phenomena relating to the Sun-Earth Connection program using relatively large "critical mass" groups of investigators that are beyond the scope of the nominally smaller SR&T tasks discussed above. Funding for the SECTP is competed in its entirety every three years. A SECTP competition was competed through the ROSS-2001 NRA and is now fully subscribed; the next opportunity to propose for this program is not anticipated until ROSS-2004.

(4) The Sun-Earth Connection Guest Investigator program is intended to maximize the return from currently ongoing SEC missions by providing support for research which heavily utilizes mission specific data from currently operating spacecraft. The current Sun-Earth Connection GI program element is described in Appendix A.3.5.

(5) The Living With a Star (LWS) Targeted Research and Technology (TR&T) program supports a range of research tasks similar in kind to those supported by the SR&T program. In the case of LWS TR&T, however, the goal of the program is to specifically address those aspects of the connected Sun-Earth system that affect life and society on the Earth. The current LWS TR&T is described in Appendix A.3.7.

(6) The Sun-Earth Connection Instrument Development program is described in Appendix A.3.6. This program supports the development of spacecraft-based instrument technologies that shows promise for use in scientific investigations on future SEC missions.

Proposals to any of the SEC program elements are expected to present within their Scientific/Technical/Management Section a clear description of a specific scientific problem, of how the attack on this problem will be carried out, and of the relevance of the proposed research to NASA's strategic objectives. The development and testing of new instrument concepts, new observing techniques, new models, and/or new data analysis techniques that are pertinent to discipline goals are also supported. However, proposals for such efforts must provide at least a brief explanation of the relationship between such proposed efforts and clearly defined SEC science problems.

Proposals with the intent of extending or directly supplementing investigations selected for current approved space flight missions are not appropriate for this NRA. Investigators who are members of the science teams of ongoing missions and who propose to use data from these missions in SR&T efforts proposed through this NRA must clearly delineate between their mission responsibilities and the proposed efforts.